The Ablation of Recurrent Sustained Ventricular Tachycardia by Intracoronary Ethanol Infusion.

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The successful ablation of incessant sustained ventricular tachycardia (VT) after myocardial infarction (MI) by the selective infusion of absolute ethanol (EtOH) into vessels supplying the arrhythmogenic myocardium has been described. We have extended this technique to the ablation of paroxysmal recurrent sustained VT. Three pts with recurrent sustained VT refractory to all available antiarrhythmic agents underwent the selective infusion of EtOH into a small coronary artery branch supplying the arrhythmogenic left ventricular (LV) myocardium, identified by the reproducible termination of VT by selective infusion of saline or ioxaglate contrast. All patients had prior MI, bypass grafting (CABG), LV dysfunction, and amiodarone pulmonary toxicity and were rejected for VT surgery or automatic implantable cardioverter-defibrillator. One VT morphology was inducible in 1 pt and 2 were inducible in the other 2 pts. After the selective intracoronary infusion of 2cc EtOH, the clinical VT was no longer inducible in any pt but a nonclinical VT was induced in 1 pt. Transient (2pts) or persistent (1pt) complete heart block complicated the procedure and 1 pt died 5d later of cardiogenic shock related to occlusion of a CABG not involved in the EtOH infusion. The peak CK-MB averaged 373. The ejection fraction (EF) was 0.34 before and 0.37 after in the 2 survivors. Autopsy showed hemorrhagic necrosis in the area perfused by the EtOH. The survivors have been free of recurrent VT with followup of up to 6 months without drug therapy and clinically well.

Thus, the intracoronary infusion of EtOH can be used to ablate VT that is not incessant but inducible with programmed stimulation. Heart block is a common complication of this procedure and the occurance of CABG thrombosis may denote nonspecific activation of the clotting system. Nonetheless, long term control of refractory VT may be achieved by this procedure.

LOW ENERGY DIRECT CURRENT ABLATION WITHIN THE CORONARY SINUS: IN VITRO AND IN VIVO RESULTS USING A NEW SYSTEM OF ENERGY DELIVERY.

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Direct-current shocks within the coronary sinus (CS) have been abandoned because of cardiac rupture and tamponade. We evaluated a new system of energy delivery, that consists of a low energy ablation power supply, with a short time constant capacitive discharge and a 7F ablation catheter with a contoured distal electrode. We compared unipolar distal shocks (D) with unipolar shocks to proximal and distal electrodes made electrically common (P-D). In vitro analysis was done in a large tank filled with saline, using high speed cinematography (32,000 frames/sec). For anodal shocks of 40 J, vapor globe and pressure recordings were respectively 26 mm and 6.4 atm for D shocks, and 22 mm and 4.9 atm for P-D shocks. Pressure increased following implosion of the vapor globe, but for less than 50 μsec. In vivo, 1-3 shocks of 40 J were given in 18 dogs, at a mean distance of 2.5±.8 cm within the CS (D shocks in 9 dogs and P-D in 9), with no cardiac rupture or tamponade. The mean extent of coagulation necrosis of the LA and summit of the LV were 1.7±.7 cm and 1.5±.8 cm respectively, with no difference between D and P-D groups. D shocks more often had hemorrhage, almost always confined to the epicardial fat space. Four dogs in each group had CS occlusion.

Conclusions: this new system produces limited barotrauma, significant coagulation necrosis and no tamponade. Distal and proximal-distal shocks yield similar results. This technique may be suitable for ablation of left sided accessory pathways.

ABLATION OF THE ATRIOVENTRICULAR JUNCTION WITH RADIOFREQUENCY ENERGY: IMPROVED RESULTS WITH A NEW ELECTRODE CATHETER.

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Percutaneous catheter ablation using radiofrequency (RF) current can be used to interrupt atrioventricular (AV) conduction in Pts with drug-refractory supraventricular tachycardia. Results of RF ablation of the AV junction using a standard 7Fr quadripolar catheter were compared to those using a 6Fr catheter modified with a larger (3mm long) distal electrode, 2mm interelectrode spacing, and a shaft with increased torsional rigidity. The ablation catheter was positioned to record the largest His electrogram from the distal electrode. An electrocoagulator (Mircrovasive Bicap 4005) supplied continuous, unmodulated RF current at 750 kHz. One to 18 applications of RF were applied between the distal electrode and a large skin electrode. A standard catheter was used in 19 Pts (Group 1) and the modified catheter in 13 Pts (Group 2). Persistent AV block was produced in 10/19 (52%) Pts in Group 1 and 12/13 (92%) Pts in Group 2 (p=.046). There were no differences in the number of RF applications/Pt (7.1±5.0 for Group 1 vs 7.1±5.3 for Group 2), or applied power (16.6±4 Watts for Group 1 vs 17.4±6 Watts for Group 2). A rise in impedance, due to dessication of tissue and coagulum formation, occured earlier (Duration of RF current flow 46±33 sec for Group 1 vs 55±33 sec for Group 2, p=.053) and more frequently (57% of applications in Group 1 vs 42% in Group 2, p=.046) in Group 1 compared with Group 2.

CONCLUSIONS: Use of a catheter with a larger distal electrode allows more RF energy to be delivered before an impedance rise occurs and appears to increase the effectiveness of RF ablation of the AV junction.

LOW ENERGY ABLATION OF ATRIOVENTRICULAR CONDUCTION: EFFICACY MAINTAINED, ENERGY AND BAROTRAUMA REDUCED, SAFETY IMPROVED.

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Catheter ablation of AV conduction is an established treatment for drug refractory supraventricular arrhythmias. Acute complications include hypotension and tamponade and in the long term there is concern about decreased exercise tolerance and late sudden death. In order to reduce the energy and barotrauma produced during catheter ablation, which may be involved in these adverse effects, we have devised a system that delivers shocks of low energy, high peak voltage and reduces the pressure disturbance. This system comprises a short time constant high voltage capacitor and a modified ablation bipolar catheter.

Ablation of AV conduction was attempted in 11 patients (aged 29-78 mean 59). 10 Patients had atrial fibrillation and one had atrial tachycardia. Sinus rhythm was restored by transthoracic cardioversion. The ablation electrode was positioned to record a larger His on the distal unipole. A mean of 3 shocks (range 1-5) was delivered to each patient with the ablation catheter as the anode and a backplate as the cathode. The mean energy of each delivered shock was 22 Joules. All patients were initially in complete A.V block but conduction returned in 4 who had a second ablation session.

At follow up of mean 9 months (range 4-19) 9 (82%) remain in complete heart block asymptomatic and off all drugs. 2 (18%) resumed AV conduction, one at 12 hours who subsequently had surgical ablation and one at 11 months who has recently had a further successful catheter ablation. There were no acute complications and no rises in cardiac enzymes.

Conclusion Ablation of AV conduction is possible at reduced energies (mean cumulative energy 60 Joules) and efficacy (82%) is maintained. The reduction in delivered energy and lack of rise in cardiac enzymes suggests that this system has improved safety.